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New Technologies and didactics in New Methodologies environment

António dos Reis

Abstract

The uprising of New Information and Communication Technologies (NICT) increases the gap on pedagogical and didactical skills on education agents. It is therefore urgent to ensure appropriate pedagogical and methodological training linked to the recent developed technological tools. Human resources skills are key tools for problem solution as opposite to an exclusive technological answer. At the present time, new research, approach and implementation in "NICM – New Information and Communication Methodology's" it is a must to improve the quality on the education process. A thought on "learn how to teach and teach how to learn" is our communication focus.

Paradigm for the future of teaching learning

Throughout the centuries learning has not only been eminently face-to-face that it also fits in a behaviorist context. The change we can see in learning examples of the late last century that came from new approaches introduced by the psychologists Vigotsky and Piaget, and the coming about of new technologies have lead towards a constructive approach. The behaviorist and constructivist modules lead to an enormous variety of hybrid pictures and possible solutions for the creation of "instructive" solutions of learning.

The methodological, technological and sociological advances that were registered on the turn of the 21st century, with the reflections emerged in the process of learning from the work of various neurophysiologists ([1]), and that reach out towards the principles of the Gardener's Multiple Intelligence Theory (1983), revised by Eduards and Winters (2001) as well as the VARK de Fleming Module (in Cornelius 2001) that resume the theme of multi channel learning visually supported.

This approach introduces a profound reflection in regards to the now classic cataloging of "traditional theory" and "actual theory", in which one has come to substitute the other.

Firstly what is named "actual theory" should instead be called "actual theory of the 90's". Today in the debut of the 21st Century, all points out towards the fact that these two theoretical approaches coexist and that they are just distanced in regards to the state of knowledge in

[1] Prof. António Damásio (Prínce of Astúrias 2005 prize, investigator for the University of Yowa, USA, introduced the importance of multi channel learning in view of the mapping of the brain and the importance of the image in the learning process, and Prof. Alcino Silva University of LA, USA characterized the learning process in the human brain under the neurophysiologic point of view.

which the apprentice finds himself, whether this state of knowledge is related to the point of his life cycle, or with another point related to his/her state of knowledge regarding a certain subject or learning process.

Furthermore, this group of aspects introduces elements of reflection in regards to the way in which the learning theory should be approached in a constructive perspective, and introduces in a generalized manner, distance learning, or the assistance to presence learning of online techniques. The teaching /learning takes on a dimension which is supported by new pedagogic methods, new didactics and new technologies, not only on behalf of the teacher/educator but also and especially on behalf of the student/apprentice.

The practical application of the constructivist module presented some difficulties in its implementation, not only in regards to the adaptation of the student in releasing himself of behaviorist and instructive activities with which he has been confronted with in so many occasions, as with the difficulty of the tutor having the instruments to effectively develop constructive practices. It is with the aid of online learning techniques that we can find the means to overcome this difficulty.

Whatever the learning theories are, they all does contribute to answer fundamental questions: "what is the nature of the specific knowledge?", and "how the learning come about?" The answer to these questions allows the redefinition of pedagogic focus, this is, to underline which will be its main focus.

As mentioned before, the current objective of education is to prepare citizens for a continuous education during the course of their lives and to give them qualifications which are permanently being updated by demand of the information and knowledge society (team work, to be able to select, research, relate within themselves, synthesize information, critical appraisal and initiation in the resolution of problems). In this way, constructivism presents itself as an involving learning theory and stimulates the process of human evolution.

However, one of the factors that mostly contributes towards change, was the evolution verified on e-learning and distance learning. The tendency is that in structured courses and those of some size, the desired format is that of b-learning, which is, a mixed format, of distance learning with online support, complemented by presence learning. The advantages of complementing these two approaches is indeed relevant (face-to-face and the online learning) due to the fact that each one of them contains qualitative ingredients that complement each other.

Now, since online learning is a qualified technique that introduces expressive benefits, why not introduce it as a complement to the presence learning.

The new paradigm for the future of teaching learning, may have the following shape:

- The behaviorism and the cognitive aspects are bridges for the student towards the constructivism of his own knowledge and his/her own ideas;
- The different theories are not substitutes, rather, they coexist and are fitted to conduct to different states of learning, it is nevertheless constructivism the one which enables the best conditions to conduct the apprentice/student to the higher state of learning and knowledge and this is to know how to evolve.

- Learning is a process that is mainly pro-active and repetitive until the state of "knowing, knowing and knowing how to do". A merely reactive and passive attitude on behalf of the student/apprentice when facing the teaching process, just leads to a primary state of knowledge that in which one "knows that it exists".
- Teaching is that more effective when the transfer of knowledge is supported by images, in motivating processes, in the experimentation and in the presentation of the study themes.
- The using of multimedia support methods and interactivity (participation in forums, group work and formative continuous evaluation) are determining processes to enhance the quality of teaching.
- In order for the students to enhance their quality levels of learning, online learning must be available as a complement to presence learning at all levels of teaching.

Online learning background

When referring to online learning, in the year 2000, it was certain we were talking about distance learning. But when today (2006), when referring to online learning, are we still exclusively talking about distance learning? Not necessarily! Today, when referring to online learning, we could be talking about presence learning support, as much as distance learning support. Due to the increase of the use of online support instruments to presence learning, it so happens that we admit that online tutoring will become an essential presence learning support tool with noticeable results in terms of improving the teaching quality.

Which changes justify this alteration? The 90th decade shows a quality leap in terms of distance learning that resulted from the consolidation of the different information and communication technologies placed at the disposal of teaching. Such as, software to make contents, video projectors, presentations tool easy to use, quick enough processors that allow effective image and video processing, like the Pentium IV, nowadays with speeds higher then 2 GHz.
Besides, hard drives with a large storage capacity and speeds to absorb a correct 7.200rpm video capture, video "streaming" system for WEB diffusion, etc., and also broad band distribution systems. All with quality and at acceptable prices for the average user, that enables a real use of the computers, multimedia aspect of the teaching components in its face-to-face aspect, as in it's via WEB distribution, which led to the present e-learning concept.
On the other hand, the existence of "open source" (free), audio and video communication software, or at very accessible rates and the increase of available bandwidth, made operational the performing of an effective online tutoring.
Even though platforms for content distribution (LMS) were already available at the beginning of the XXI century, the market prices were still extremely high, which made them difficult to be used. Open source platforms started to emerge only in 2004, which introduced a substantial utilization cost reduction and made viable the generalized use of course management platforms in all teaching levels.

What were the most relevant occurrences during the last decade of the XXth century and the beginning of the XXIst century, which impacts the learning/ teaching processes?

Characterization of the brain's mapping and identification of Image as a determinant factor in the knowledge transfer. Prof. Antonio Damasio

The characterization and the learning process in the human brain by the neurophysiologist Prof. Alcino Silva

The "changing revolution" and the knowledge and information society

Deep changes in the teaching process – The software optimization allowed the spreading of online multimedia contents (STREAM VIDEO – 1997, massive broad band availability, high rated audio compression – mp3 and video – mpg, wmv, swf, mov, e-meeting and conference calls software) and the availability of important didactic instruments (teaching platforms – LMS) and the optimization of pedagogical methodologies

How did the e-learning concept evolve and what is its current content? The definition of "e-learning" has presented a diversity of definitions, which have been transformed, since it has come about.

In some way this is related with the analogy between the processing of information assisted by computers and teaching. From then on, computational programs were designated as CBI (*Computer-Based Instruction*), CBT (*Computer-Based Training*) or simply CBL (*Computer-Based Learning*).

During the 90's, e-learning appears very connected to distance learning, however Rosenberg (2001) introduces some reflection about its exclusive relationship and dependency with distance learning.

…"e-learning is a way of distance learning, but distance learning is not necessarily e-learning"…

Rosenberg's intention here is to separate all long distance learning that use electronic and multimedia supports, from the distance learning supported on the distribution of printed documents.

There is a generalized understanding today, that "e-learning" integrates the group of teaching techniques and instruments supported by computerized means, or online learning, namely audiovisual, being used either in a classroom or in distance learning.

Therefore, e-learning is an electronically supported teaching process, with contents distributed or not online, in a multimedia format with tutoring and online formative evaluation.

Because of this some authors state that: … "the arrival of e-learning was revolutionary for the teaching process in such a way that even at classroom level teaching will never be as it was until the 90's".

This context points out that "e-learning" can be divided into two large groups, teaching in a face-to-face environment and teaching in a distance environment.

This would result in a new arrangement of concepts and content:

e-learning

- B – learning (presence learning)
  - C Formative multimedia contents (face-to-face or at a distance), online tutoring and online formative evaluation
- D – learning (distance learning)
  - Auto study (contents and evaluation)
  - Online tutoring (contents, tutoring and evaluation)

Conclusions

The e-learning may represent an important instrument of support to the presence learning. However, bearing in mind that online learning stands on four structural pillars as follows:

New learning and teaching methodologies
Distribution of contents in multimedia format
Online tutoring
Formative online evaluation

Online learning represents a qualitative benefit to the teaching and learning processes, however this also means that it does not need to be practiced in its four outcomes, but in order for it to happen in a qualified fashion, it is necessary that one of its ingredients always be present, by this we mean, the new learning and teaching methodologies are only obtained through an adequate specialized formation/education of its teachers.

The preparation of the contents in multimedia format is one of the most complexes and difficult to develop outcomes, it is not advisable that the introduction of a teaching system based on online techniques gets started through this outcome.

The usage of online tutorial methods, for both distance learning in its pure format as for the support of presence learning, has become a **fundamental instrument** to improving the process of knowledge transfer demanding the educator/teacher's to acquire new skills in: teaching methodologies and pedagogy/teaching and management of technological tools beyond the ones traditionally used before.

The implementation of the Bologna system makes it even more evident the implantation at a higher level of education of online tutorial techniques, in order to make the teaching process effective.

The teacher's specialized formation/education in this area is not only an important request as it is an urgent one. Without it, the effectiveness of distance learning is not possible, as presence learning loses one of its most important support tools to the enhancing of performance and quality of teaching.

We recommend that a phased introduction of the online learning should be made, that comes about by:

1. Online tutorials applied to most face-to-face courses and distribution of online contents, not including multimedia format in the first phase;
2. Introduction to online formative evaluation to complement the previous phase;
3. Distribution of contents in multimedia format and begging to make available some courses in mixed format (b-learning) in specialized areas:

All these phases should be strongly accompanied by supporting and formative units of the tutors/teachers. This turns out to be the most effective approach to the introduction of the process and that contemplates less risk both personal and institutional. In our opinion, online learning is a pressing and urgent necessity, does not represent a fatality but represents inevitability.

We also conclude the following on the topics below:

What approximates presence learning and distance learning.

Until the beginning of the 20th Century, presence learning and distance learning prevailed in two different worlds. With the evolution of e-learning into b-learning (mixed system, face-to-face and at a distance) and an expressive technological evolution that allows the production and content distribution today, in a variety of formats, makes what we can call online learning, on the way to an information and knowledge society, become an important support instrument in the teaching and learning process also in a face-to-face environment.
We can say that presence learning should and may constitute an outcome of mixed learning as well as, online learning should and may constitute an outcome of presence learning.
In this way when we speak of online learning today, we may be talking about supporting presence learning, as talking of supporting distance learning. So long as the technological requisites are filled, online learning may constitute an important tool in the supporting of presence learning given the advantages in terms of potential, aperture and versatility.
Today there are no limiting factors so that online learning cannot be used at all levels of teaching with the necessary and adequate adjustments.

We characterized and evaluated the outline of online tutoring and its contribution in order to enhance the quality of teaching.

Online tutoring is similar to the one in which the teacher develops a face-to-face approach, except when he or she adds new online technologies and new methodologies to the traditional environment.
Online tutoring reveals itself today as one of the four master pillars in which online learning rests itself and these are: New learning and teaching methodologies; the preparation of contents in multimedia format; online tutoring; online formative evaluation.
Online tutoring allows for the development of interaction, discussion, group work in the collaborative and cooperative forms. It makes available a group of technological tools which facilitate and make effective the student's interactivity – content, student- professor/teacher and student – student. It presents important advantages over the tutorial techniques,

developed in a face-to-face environment without the aid of the group of available technological means. Many specialists have tested the enhanced performance of online tutoring over traditional tutoring, such as McKenzie (2000), Pickering & Duggleby (2000) Cornelius (2001) amongst others.

The general opinion of online tutoring and the current contribution of online tutors with relevant experience in this area.

We have based opinions put forth in this piece on the work of specialists that perform in a consolidated manner their teaching experience in this field.
We can synthesize that online tutoring, is not an easy task, it requires specialized education/ formation on behalf of its teachers in pedagogical competences, didactics and technological ones and in a learning process to be learnt by the students.
Online tutoring allows effectively for a continuous formative evaluation and facilitates a real constructivist approach and effectively allows for an interactive approach outside the classroom.
Ballantyne (2000) explicitly mentions that "... the tutors have to adjust their performance in traditional teaching. I admit that we all must adapt to a new reality of teaching and learning…"

The identification of the adequate technological environments and the various conditions to the functioning for the practice of online tutoring in a face-to-face environment in various levels of teaching.

If on one hand distance learning has been identified as being directed towards a specific segment of adult students and strongly motivated and engaged, online learning with face-to-face support may be practiced at all levels of learning.
Where the multiform contents are excellent elements to document and complement the narrative exhibition of the tutor/teacher, the online evaluation is an important instrument of formative evaluation and online tutoring which allows for the complementing in a complete and effective manner the vague and absent process that we could observe in face-to-face tutoring.
In order for online tutoring to work, it is a necessary condition that there is an adequate technological environment in the teaching institution, namely an internet connection, the existence of a computer, an audio visual room with video projection and an interactive board specially for lower levels of teaching.
Generally, today, schools are beginning to be reasonably technologically equipped and are therefore capable of developing online tutoring activities.
However it is necessary to proceed to the adequate formation/education of the teaching board, in these technologies, for the different levels of teaching and making available the contents in multimedia format both in quantity and quality, orientated towards the *curricula* of the various educational levels.

The characterization of the teaching and learning paradigms for the future, set to enhance the quality of teaching in a global society.

In regards to the teaching and learning paradigms for the future we have tried to synthesize them in the following points:

- Behaviorism and cognitive issues are introducing bridges of the student towards the constructivism of knowledge and ideas. The different theories have not substituted each other, rather they coexist and conduct people into different states of knowledge. Nevertheless, it is constructivism that produces the conditions to lead the student to the higher levels of learning and knowledge; this is knowing how to evolve.
- For students to improve their quality levels of learning, online learning should be made available as a complement to presence learning, at all levels of learning.

NICT – New Information and Communication Technologies, is a must to improve teaching and learning quality, however, only when built in NICM – New Information and Communication Methodologies they can fulfill that propose. Using NICT without the adequate NICM, most probably, we will be doing "technological noise" instead.

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